

First record of Atypidae (Araneae) in Rovno Amber

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Abstract — The family Atypidae is reported from Rovno amber for the first time on the basis of a juvenile specimen described here as *Atypus* sp. It is fourteenth family of spiders reported from Rovno amber. *Balticatypus* Wunderlich 2011, a genus known from three species from Baltic amber, and the tribe Balticatypini Wunderlich 2011 are synonymised with *Atypus* Latreille 1804 and Atypini Thorell 1870 respectively. The diagnoses of the fossil genus and tribe were primarily based on the relative size of spinnerets of the first nymph, which are subjects of the ontogenetic changes. Our study reveals that the nymphs of the extant European species of *Atypus* have the same size and shape of the spinnerets as in the species described from the Baltic amber.

Keywords — Aranei, spider, fossil, new synonymy, spinnerets, nymph

Introduction

The Atypidae are a small family of mygalomorph spiders with 52 extant species belonging to three genera distributed across temperate regions of the Holarctic, in Africa, and South-East Asia (World Spider Catalog 2017). Besides extant taxa, two genera and four species are known as fossils: the Early Cretaceous *Ambiortiphagus ponomarenkoi* Eskov & Zonstein 1990 from Mongolia, and three species of *Balticatypus* Wunderlich 2011 from the Late Eocene Baltic amber (Wunderlich 2011; summarized by Dunlop et al. 2017). In addition to the above-mentioned taxa, Wunderlich (2015) reported one undescribed species from the Late Cretaceous Burmese amber that probably belongs to Atypidae. While studying inclusions from the Rovno Region we recognized one specimen belonging to Atypidae, a family previously unknown from Rovno amber. Rovno amber shares the same age with Baltic amber, hence being of Late Eocene origin (Aleksandrova & Zaporozhets 2008; Perkovsky et al. 2010). The goal of this paper is to report the newly recorded family and provide comparison with species known from Baltic amber.

Material and methods

Photographs of the amber specimen were taken with a Leica M165C stereomicroscope with a Leica DFC 420 camera in the Paleontological Institute RAS, Moscow (PIN).

Extant specimens of three European *Atypus* species were photographed with a Canon EOS 7D camera attached to an Olympus SZX16 stereomicroscope at the Zoological Museum, University of Turku, Finland. Digital images were montaged using CombineZP image stacking software. Measurements are given in millimetres. First nymphs of three European *Atypus* species were sent to us by Milan Řezáč. The amber specimen is deposited in the collection of the Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine, Kiev (SIZK).

Taxonomy

Family Atypidae Thorell 1870

Atypus Latreille 1804

Oletera Walckenaer 1805: 7.

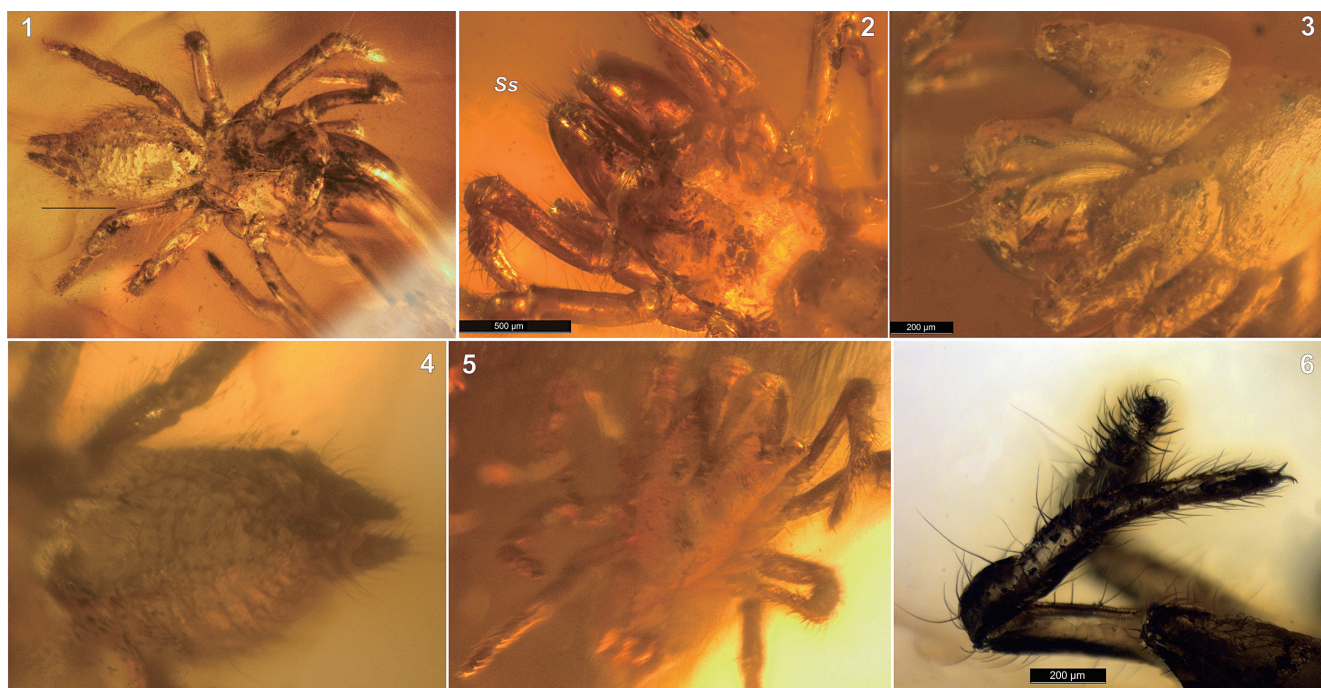
Proatypus Miller 1947: 52.

Atypus: Kraus & Baur 1974: 88; Gertsch & Platnick 1980: 9; Raven 1985: 124; Schwendinger 1990: 353.

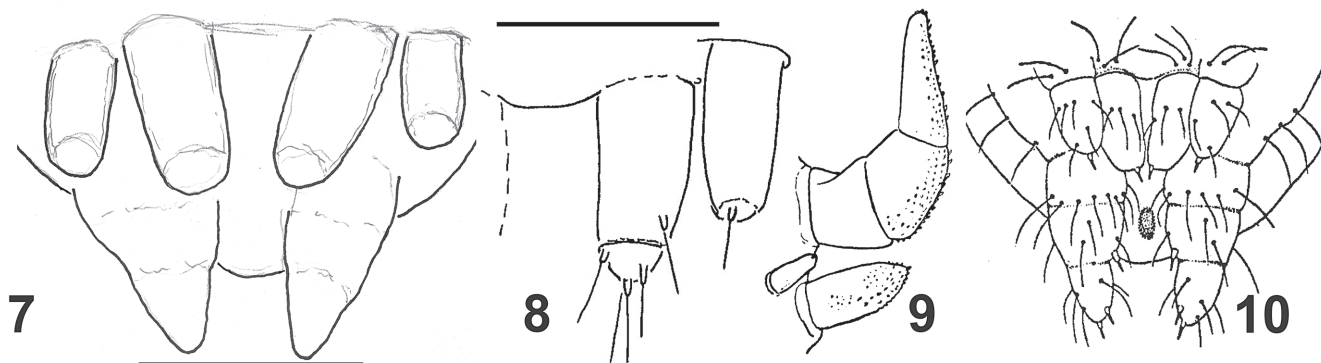
Balticatypus Wunderlich 2011: 482. **Syn. n.**

Type species. *Aranea subterranea* Roemer 1789 (= *Atypus piceus* (Sulzer 1776)).

Note. All catalogues as well as major revisions (Kraus & Baur 1974; Gertsch & Platnick 1980; Schwendinger 1990) indicate that type species of the genus is *Atypus piceus*, al-



Figs. 1–6. *Atypus* sp. from Rovno amber. 1, habitus, dorsal; 2, prosoma, dorsal, showing strong setae (*Ss*) in anterior part of chelicera; 3, prosoma, latero-ventral; 4, abdomen, ventral, showing spinnerets; 5, body, ventral; 6, legs I and II, showing lack of spines. Scales = 0.5 mm (1–2, 5); 0.2 mm (3, 6).



Figs. 7–10. Spinnerets of four *Atypus* species. 7, *Atypus* sp. from Rovno amber, third or fourth instar; 8, *A. juvenis*, first instar (after Wunderlich 2011); 9, *A. piceus*, adult (after Miller 1947); 10, *A. karschi*, first instar (after Yoshikura 1958). Scales = 0.2 mm if indicated.

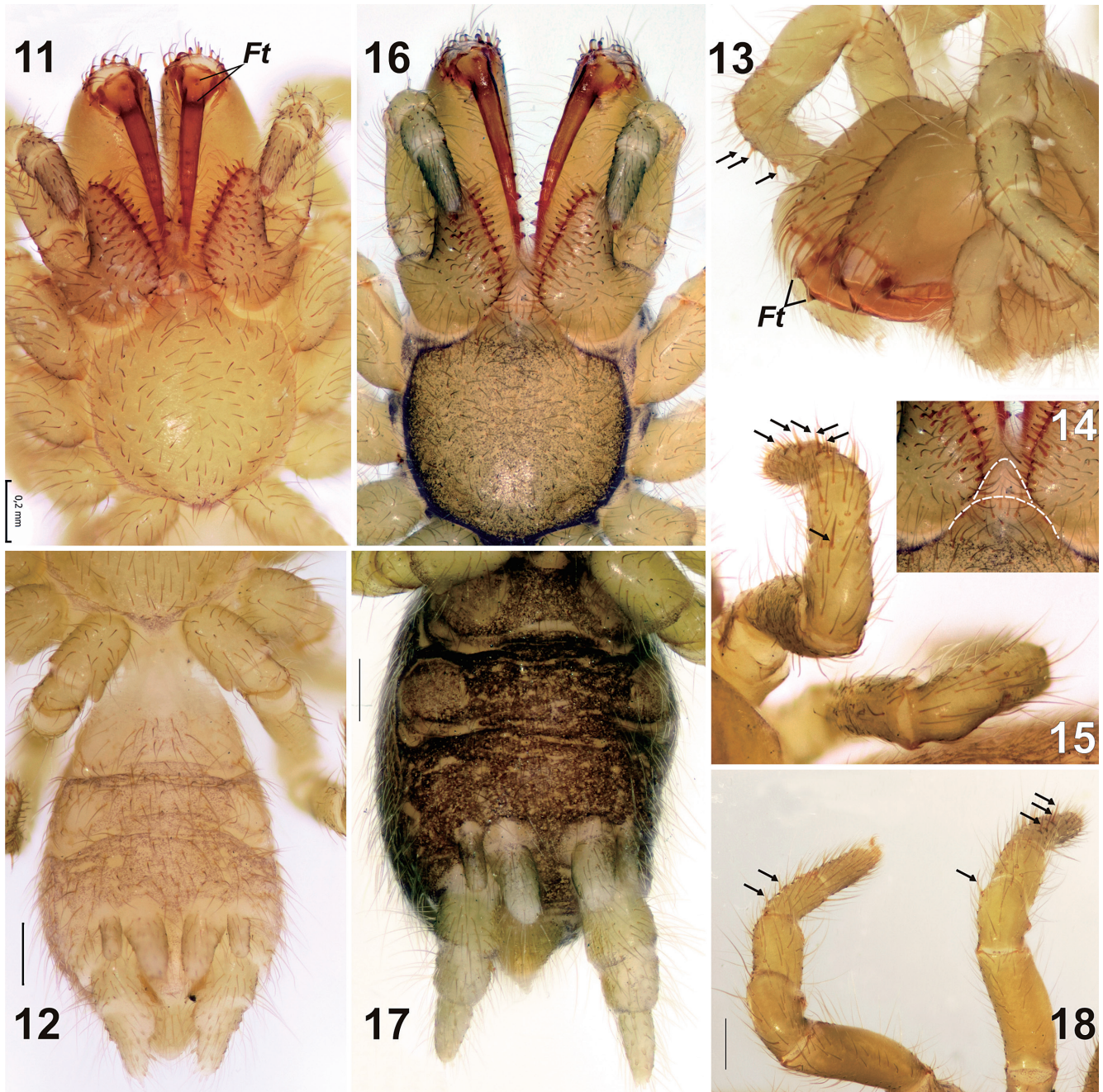
though Latreille (1804) mentioned as a type *Aranea subterranea*, a species considered as junior synonym of *A. piceus*.

Comments. So far 32 extant species are known in the genus (World Spider Catalog 2017). *Atypus* is distributed in the Western Palaearctic (east to western Turkmenistan), the Eastern Palaearctic (south part of Russian Far East, China, Japan and Korea) and in the Oriental Region (from India to Indonesia) (World Spider Catalog 2017). One species, *Atypus snetsingeri* Sarno 1973, is known from USA, but is most likely introduced (Raven 1985) and may be a synonym of *A. muralis* Bertkau 1890.

Atypus sp.
(Figs. 1–7)

Material. SIZK K-26650, Klesov (amber quarry ‘Pugach’), Rovno amber, Late Eocene. Well-preserved inclusion in clear yellow amber, its weight 0.35g after primary treatment. Syninclusions: absent.

Description. Body 3.5 long (Fig. 1). Carapace 1.73 long, 1.25 wide. Fovea indistinct (Fig. 2). Sternal sigillae not recognizable (Figs. 3, 5). Chelicera with long and strong anterior setae (*Ss*, Figs. 2–3). Legs with poorly distinct short and stout bristles (Fig. 6). Tarsi without trichobothria (Fig. 6). Anterior median spinnerets 1.5 times thicker and 1.3



Figs. 11–18. Morphology of the first nymph of *Atypus affinis* (11–15) and *A. muralis* (16–18) from the Czech Republic. 11, 16, prosoma, ventral; 12, 17, abdomen, ventral; 13, anterior part of prosoma, lateral; 14, labium, showing outline of sclerotized and membranous parts; 15, legs III and IV; 18, legs II and III. Arrows indicate leg's spines. Ft: fang teeth. Scales = 0.2 mm if indicated.

times longer than anterior lateral spinnerets (Fig. 7).

Comments on synonymy of *Balticatypus*

While describing *Balticatypus* Wunderlich 2011 (type species *B. juvenis* Wunderlich 2011 from Baltic amber), Wunderlich (2011) described also a tribe *Balticatypini* Wunderlich 2011. It is worth noting that the family *Atypidae* is not currently subdivided into subfamilies, although there are

clear differences in the shape of the carapace and chelicera between *Atypus* Latreille 1804 and *Sphodros* Walckenaer 1835 on the one hand and *Calommata* Lucas 1837 on the another hand. Due to these differences the latter genus was considered in a separate family *Calommatoidea* Thorell 1887. By creating the tribe *Balticatypini* Wunderlich (2011) placed the morphologically different *Atypus*, *Sphodros* and *Calommata* in the nominative tribe *Atypini*.

Wunderlich (2011) diagnosed *Balticatypini* by the anterior lateral spinnerets being subequal in size to the anterior median (as opposed to smaller in other genera, Fig. 9), the terminal parts of the median spinnerets not being truncate as in extant species and labrum having a spur (lacking in the other genera).

It seems to us that the holotypes of all the fossil *Balticatypus* species (*B. juvenis*, *B. biegelei* and *B. spinosus*) described by Wunderlich (2011) are represented by second instar (first nymph) individuals. Their sizes vary from 1.25 to 1.6 mm. Extant first nymphs of three European species have length either 1.75–1.9 mm in *Atypus affinis* and *A. piceus*, and are somewhat larger 2.25–2.5 mm in *A. muralis*. Given that the size of the Rovno's specimen is 3.5 mm, it is probably a third or fourth instar. The size of adult specimens of belonging to extant species occurring in Europe varies from 7 to 15 mm (Nentwig et al. 2017).

Wunderlich (2011) mentioned two characters that separated *Balticatypus* from *Atypus*: 1) “anterior (lateral) spinnerets not much smaller than the medians which end [tip] is convex” (Fig. 8), 2) a labrum with a spur at least in *B. juvenis*.

1) Relative length of the spinnerets seems to us to be age-dependant. In detail, the size of the anterior lateral spinnerets decreases in comparison to the lateral median spinnerets with every molt. Yoshikura (1958) illustrated spinnerets of the first instar (pre-nymph) of *Atypus karschi* Dönitz 1906. In *Atypus karschi*, the anterior spinnerets are similar size, and the median spinnerets are not truncate as in adults (Fig. 10). We examined first nymphs of three extant European species and found size difference between the median and lateral spinnerets not be so large and similar to that in *Balticatypus*. Median spinnerets in the first nymph of European *Atypus* and *A. karschi* from Japan are not truncate (Figs. 10, 12, 17).

2) Regarding the presence of a labral spur in *Balticatypus juvenis*, such a spur is documented for the type species only (Wunderlich 2011: fig. 7). It is likely that the spur in figure 7 in fact represents a membranous part of the labium (cf. Fig. 14).

Discussion

Wunderlich (2011) speculated that stout spines on the legs II–IV (only patella III is shown on fig. 12) and a hook on the fangs (fig. 7) indicated burrowing behaviour by *Balticatypus*, although 2 fine teeth (and not a hook) on the fang (Figs. 11, 13, 16) is a character common for *Atypus* and *Sphodros* (Raven 1985). Stout spines are present on all legs in extant *Atypus* (Figs. 13, 15, 18). Characters mentioned by Wunderlich and suggesting that *Balticatypus* is burrowing are present in extant first nymphs of *Atypus*. However, the burrowing behaviour has not been observed in those nymphs. They stay for a long time in the mother's nest, overwinter in Europe and Japan (Enock 1885; Miyashita 1992) and disperse by ballooning at spring.

It is worth noting that the extant *Atypus*, at least in Europe, have rather large ranges in comparison to all other

mygalomorphs in the region which are typically local endemics. This is almost certainly due to dispersal by ballooning which is well documented in Atypidae (Enock 1885; Coyle 1993).

It seems that all atypids from Baltic ambers became trapped by resins when they dispersed by ballooning, although the specimen from Rovno amber was most likely trapped when spider was walking as it seems to be too large for ballooning.

The discovery of Atypidae in Rovno ambers raises the number of families formally reported in Rovno amber from 13 (Wunderlich 2008) to 14. Perkovsky et al. (2010) mentioned occurrence of up to 30 families, but no additional data has been published.

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